DUAL-TEX

EVALUATION OF DUAL-TEXTURE GRADIENT PATTERN

BY THE ASSOCIATES,

OFFICE OF
MILITARY LEADERSHIP

UNITED STATES
MILITARY ACADEMY

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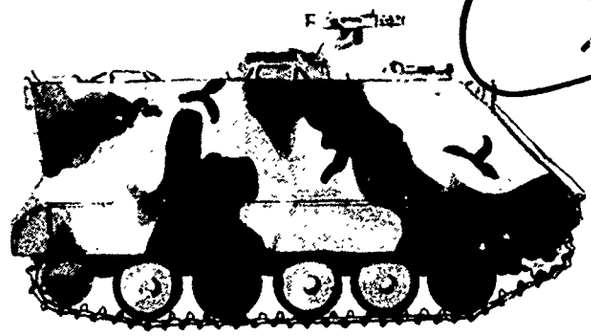

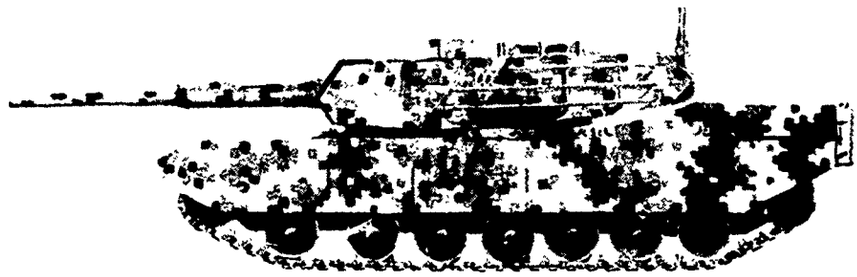

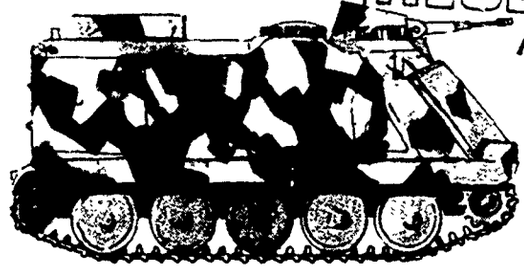

ORIGINAL CONTAINS COLOR PLATES: ALL DDC

COVER:

Front, top to bottom: M113A1, US Army pattern; XMI Dual-Tex pattern; PbV 302, Swedish Army pattern.

Rear, top to bottom: M577A1, USAREUR pattern; KPz Leopard II, Bundeswehr pattern; FV.432, UK pattern.

NOTE: Further information and materials are available concerning the Dual-Tex pattern. Requests should be forwarded to:

MAJ Timothy R, O'Neill
Office of Military Leadership
US Military Academy
West Point, New York 10996

Telephone points of contact: MAJ T.R. O'Neill or CPT William L. Johnsmeyer, US Military Academy; AV 688-2515/4127.

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DUAL - TEX:

EVALUATION OF

DUAL - TEXTURE GRADIENT PATTERN

BY

THE ASSOCIATES,

OFFICE OF MILITARY LEADERSHIP

UNITED STATES MILITARY ACADEMY

WEST POINT, NEW YORK

* * *

MAJ Timothy R. O'Neill, AR
CPT William L. Johnsmeyer, IN

*

CPT James M. Brusitus, AR
MAJ Bruce T. Caine, IN
CPT Mark L. Frey, EN
LTC Thomas G. Johnson, IN
CPT Harry N. Lumpkin, QM
CPT Thomas N. Meriwether, AR
MAJ Kim H. Olmstead, AR
CPT David L. Taylor, AR

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This study compared the effectiveness of an experimental camouflage concealment pattern (Dual-Texture Gradient Pattern) with a selection of existing patterns and unpatterned targets in summer and winter (snow) conditions. Approximately 260 US Military Academy cadets were employed as subjects. Color slide series were used to simulate field conditions. The experimental pattern was found to be significantly more effective than other pattern measures tested. Field validation was recommended.

DISCLAIMER

NOTE: Any conclusions in this report are not to be construed as official US Military Academy or Department of the Army Positions unless so designated by other authorized documents.

ACKNOWLEDGEMENTS

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1. BACKGROUND

1.1

Recent trends in tactical doctrine for United States ground forces suggest the inevitability of "fighting outnumbered" in the initial stages of the next war - a position of numerical inferiority which only increases the need for the most effective training, doctrine and equipment. Most strategies for fighting outnumbered have relied upon increasing defensive effectiveness with the goal of producing extremely unbalanced favorable exchange ratios - through improved hardware, sophisticated doctrine and perfection of direct-fire gunnery techniques. There is, however, a complementary passive approach to the problem of improving exchange ratios: perfection of countersurveillance techniques which will reduce the vulnerability of critical weapons systems in the Active Defense posture.

1.2

The increased emphasis on passive countersurveillance technology has been impressive in the last 4-5 years, particularly in view of its effective neglect since the end of World War II. The new interest includes development and testing of pattern-painting designs and techniques, artificial garnish, reduction of thermal signatures and other efforts. The improvements in reduction of equipment signature has been validated in field tests (see references 1-3, appendix VI), and the general concepts have gained wide acceptance. The existing measures, however, offer anything but a panacea for the problems of battlefield countersurveillance.

1.3

One striking shortcoming in the present system is inherent in the nature of pattern-painting: that this measure alone is not sufficient to reduce target signature to favorable levels. The present US Army pattern has been proven effective in comparison to unpatterned vehicles, but it is stipulated in all such reports that the pattern itself must be enhanced with astute employment of natural and artificial garnish (nets, disruptors, natural shrubbery, careful siting and other techniques). This assumption is acceptable in most cases, and certainly for relatively static targets: headquarters complexes, firing battery positions, and for most combat systems. However, the developing Active Defense posture poses special problems:

1.3.1 There is no reduction in the need for effective camouflage for critical systems - particularly for direct-fire anti-armor systems (MBT, MICV and ITV) - and their early and potentially prolonged committment to close combat argues, in fact, for extraordinary countersurveillance measures. Such systems are the basic instruments of favorable exchange rates, and their vulnerability must as a consequence be reduced as far as possible without degrading the effectiveness of their fighting capabilities.

1.3.2 The satisfaction of the requirement for concealment may not be realizable in the present context because of the explicit requirement for extensive garnish. These critical systems must be capable of displacing more frequently in the Active Defense than has been the case in the past. The use of extensive camouflage netting and related kits - to say nothing of frequent gathering of natural garnish - may prove so time-consuming that tactical displacement would be slowed below levels acceptable in the current doctrine; or, even more likely, the use of such measures would soon be abandoned in combat as a necessary tradeoff to mobility. In either case, overall system and tactical unit effective-

ness would be degraded in a situation which begs all the enhancement possible.

1.4

The need for extensive use of garnish is due largely to practical limitations inherent in the idea of pattern-painting. The specific identifying characteristics (signatures) of most targets are so overwhelming that simple application of paints is, taken alone, relatively ineffectual. The obvious question, then, is: to what extent can the effectiveness of patterns be improved to reduce the need for bulky garnish which restricts tactical mobility?

1.5 The Problem

1.5.1 Camouflage as a military technique consists of the purposeful degradation of a target signature with the objective of reducing an enemy's ability to detect the presence of the target and identify its type. The term signature is a military term which will be defined for the purposes of this study as: "a schema or organized aggregate of distinctive features unique to a specific stimulus category." The various schemata which are characteristic of military targets include visual (white light), visual (infrared), thermal, auditory, radar, and olfactory; this study is concerned principally with visual signature in the visible light spectrum.

1.5.2 Two variables affect the power of a concealment pattern: observer characteristics and target/pattern characteristics. It is generally hypothesized (though a lack of empirical demonstration has historically made these presumptions tentative) that observer properties include:

1.5.2.1 Innate perceptual organizing properties (gestalt principles): closure, good figure, continuation, similarity and related individual characteristics.

1.5.2.2 Individual cue-search habits: learned or innate visual search patterns.

1.5.2.3 Prior learning and perceptual set: familiarity with target stimulus categories and their attendant schemata. These might include prior experience in the field with vehicles; familiarity with shadow patterns (see figure 1), shape, color, and related signatures which prime the observer to perceive such expected stimuli.

1.5.3 Pattern properties contribute to concealment in a variety of ways, but most properties can only be evaluated subjectively. Observation of pattern performance in a variety of situations suggests to the authors that the variables most frequently involved are, in approximate order of importance:

1.5.3.1 Value contrast of pattern and ground: if the overall value (relative brightness) of the target is significantly different from the background, detection is usually quite easy.

1.5.3.2 Color contrast of pattern and ground: this may seem intuitively obvious, yet most pattern applications in use in US Army units violate this principle.

1.5.3.3 Intra-pattern value differentiation: if sufficient value contrast is not present in the pattern, the pattern will merge at some range into a monocolor, and the disruptive effect will be lost.

1.5.3.4 Texture-gradient contrast with the ground: most patterns match the texture of the environment only at relatively long ranges; this ignores the problem of observation under optical magnification (such as gunner's sights, rangefinders and other common observation aids). At closer examination, broad patterns will "stand out" against the background.

1.5.4 Given these characteristics and constraints, the problem is one of developing a concealment pattern which offers maximum practical concealment value under all common threats without requiring the use of extensive garnish which restricts tactical mobility.

1.6 The Dual-Texture Gradient Pattern

1.6.1 The problem cited above has generally been regarded by camoufluers as virtually insoluble. However, recent examination of alternative pattern schemes suggests that there may be measures which will meet the concealment/mobility requirements of the Active Defense. The Dual-Texture Gradient Pattern developed within the Psychology Committee, Office of Military Leadership, US Military Academy, is intended to fill this specific need.

1.6.2 The pattern (see figure 2 and appendix I) is derived from the US Army pattern system developed by the US Army Mobility Equipment Research and Development Command, (MERADCOM), at Fort Belvoir, VA, a measure which has been in widespread use for several years. At longer ranges and without optical enhancement it is not readily distinguishable from the standard measure. However, the broad color patterns of the US Army Pattern have been randomly disrupted to produce a higher texture gradient under closer observation.

1.6.3 At longer ranges, the Dual-Texture Gradient (DTG) pattern merges into a macropattern of broad light and dark areas which matches the texture of the ground at that distance. At closer range (under optical magnification) a micropattern resolves which provides a continuing match with the background texture. This micropattern is conceived as based on a square grid: not because squares are particularly effective shapes for concealment, but because pattern design is simplified by developing the micropattern from the US Army pattern (as a macropattern) by computer, as a relatively simple linear programming technique.

1.6.4 The obviously more complex pattern may be criticised for difficulty in application at unit/organizational level. However, the pattern is not nearly as precise in practice as the drawings suggest. In fact, the "squares" provide only a guideline for the drafter and painter and the pattern would be in application much less formal.

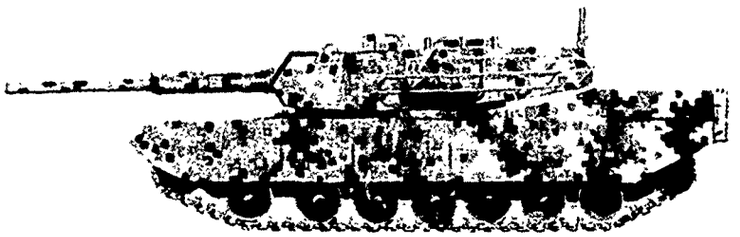


Figure 2. Dual-Texture Gradient Pattern (XM1)

1.6.5 The DTG pattern is not designed for use without garnish of any kind; in all probablility, this goal is unattainable. However, it seems reasonable to presume that an extremely effective pattern could at least dispense with the bulkier items, particularly nets and disruptor kits which must be anchored to the ground and detached and stowed when the vehicle must move. This is the goal of the Dual-Texture Gradient Pattern.

1.6.6 Before continuing development of the pattern or moving to broader field tests, it appeared necessary to demonstrate a significant advantage in performance for the DTG pattern over other patterns in use.

2. OBJECTIVE

The purpose of the research described in this report was the comparative evaluation of the Dual-Texture Gradient Pattern against selected existing measures. To be considered for even limited application in the Active Defense, the DTG must demonstrate a significant advantage in terms of range to detection and range to identification over at least the present (MERADCOM) measure and unpatterned targets.

3. SCOPE

3.1

Because of practical physical restraints and because of the need to isolate pattern configuration as the independent variable, the test was conducted as a laboratory simulation of field environment. This naturally introduced some distortion of the actual processes involved in field detection and identification; however, these distortions were uniform over all patterns compared.

3.2

The test was conducted from August 1976 - February 1977 at West Point,

New York, by selected members of the Psychology and Leadership Committees, Office of Military Leadership, United States Military Academy. The research is still in progress at this time.

3.3

During the experiment, approximately 260 US Military Academy cadets were employed as subjects; the experiment was used to supplement instruction in visual perception and experimental method as part of a Third Class (sophomore) course in introductory psychology. Details of subject selection and characteristics are at Appendix IV.

3.4

Funding of the research was at the expense of the officers concerned, with the exception of 20 gallons of paint provided as a courtesy by the US Army Mobility Equipment Research and Development Command.

4. SUMMARY OF RESULTS

4.1

The Dual-Texture Gradient Pattern, tested under laboratory simulation of field environment, proved to be significantly more effective than the US Army pattern and a solid forest green control target in summer temperate environment under the specific conditions tested.

4.2

The DTG Pattern proved significantly more effective than the US Army and an adaptation of the Swedish Army patterns during winter (snow) conditions, but proved under the specific conditions tested not significantly more effective than a solid white control panel.

5. CONCLUSIONS

5.1

That the Dual-Texture Gradient Pattern appears to offer the potential for significant improvement over present measures in a variety of environments.

5.2

That the Dual-Texture Gradient Pattern requires field validation under tactical conditions.

6. RECOMMENDATIONS

6.1

That field validation tests of the DTG pattern be undertaken to determine the actual degree of improvement over present measures, and that the impact of the reduction in system vulnerability produced by application of the DTG pattern be evaluated, along with practical measurement of time and cost constraints to determine the total value of the measure in terms of systems effectiveness.

7. CONDUCT OF TESTING

7.1 Objective

Determine the relative effectiveness of the Dual-Texture Gradient Pattern in terms of range to detection and range to identification against existing measures.

7.2 Method

7.2.1 General.

The basis of the laboratory simulation was the use of several series of 35MM color transparencies taken at various ranges from most distant to least distant from target panels painted with the camouflage patterns being compared. Subjects viewed the slide series and detected the targets and identified their form at varying ranges due to pattern characteristics and individual abilities. Mean detection and identification ranges for each pattern were recorded and compared.

7.2.2 Panel Preparation: In both summer and winter phases, the targets were 4 x 8 foot panels of insulation board with a 2-foot section of corner removed at an angle of 45 degrees (see appendix 1). The panels were painted with a mixture of standard pigment provided by MERADCOM (Forest Green and Field Drab) and matte-finish latex paints locally purchased and matched to the US Army standard camouflage pallette.

7.2.3 Two separate test sites were used for preparation of the slide series:

7.2.3.1 Summer phase: open field bordered by trees and shrubs at Stewart Army Subpost, Newburgh, NY. The field was surveyed and marked to allow a straight line of approach to the targets. Targets were emplaced at a point in the tree line and a path measured in 25 foot intervals to a distance of 675 feet. This path served as the guideline for positioning the camera. A series of 22 35mm slides was taken of each of three targets: DTG, US Army Pattern, control panel (Forest Green). The photo series was taken between 1330 and 1530; there was no cloud cover; since the distance was relatively short, coefficient of transmission was considered a negligible factor. In order to maintain uniformity between target-series, the following procedure was followed:

a. Photographs were taken at 25-foot surveyed intervals, from 675 to 75 feet.

b. Target panels were shifted at each position without moving the camera; in this way, the elapsed time for all three photographs at each position was extremely short (less than two minutes in most cases), and illumination conditions were thus kept extremely uniform among target-series.

7.2.3.2 Winter phase: Upper Reservoir for the Village of Cornwall-on-Hudson. This is a small (less than 1000-meter diameter) lake bordered by high ground and hardwood trees and shrubs. At the time of the photo-series execution, the lake was frozen and snow-covered, providing an extremely level open area with favorable background. Procedures were the same as those described in paragraph 7.2.3.1, except that a fourth target panel had been added, using the Swedish Army pattern. All panels had been modified for winter (snow) environment (see photographs, appendix III).

7.2.4 Cadet subjects viewed the various slide series for summer and winter phases. The subjects were not familiar with target characteristics and had not been given the specific objectives of the experiment. The following procedures were used:

7.2.4.1 Groups of 4-5 subjects were given the following instructions before moving to the test position:

"You will be shown a seris of 35MM color slides of an open field and a tree line. Each picture will be on the screen for five* seconds. Each picture will be closer to the tree line than the one before it -- in effect, you will seem to be moving toward the tree line.

"A target has been placed in the tree line. It is visible, but partially concealed. (The target is a panel cut in one of the four shapes shown on this card)**

"Your task is to search the tree line until you have detected the target. DO NOT GUESS: be fairly certain you see the target before you signal detection. When you do see the target, signal 'stop' and the projectionist will stop the series on that slide. At that time you will be asked by the controller to point out the target.

"Do you have any questions?"

7.2.4.2 At this point, subjects were moved to the test position, where the slide series was administered individually to each subject.

7.2.4.3 Each subject was seated approximately one meter from a translucent rear-projection screen. The controller was seated to the rear of the subject and out of the subject's view to avoid inadvertant nonverbal cues. The slide series was projected from the rear of the screen; stimulus size was 1.4 meters horizontally by 1.0 meters vertically (see photograph, appendix III). Subject was provided a pointer and, in the winter series, a card showing four alternative target shapes (see figure 3).***

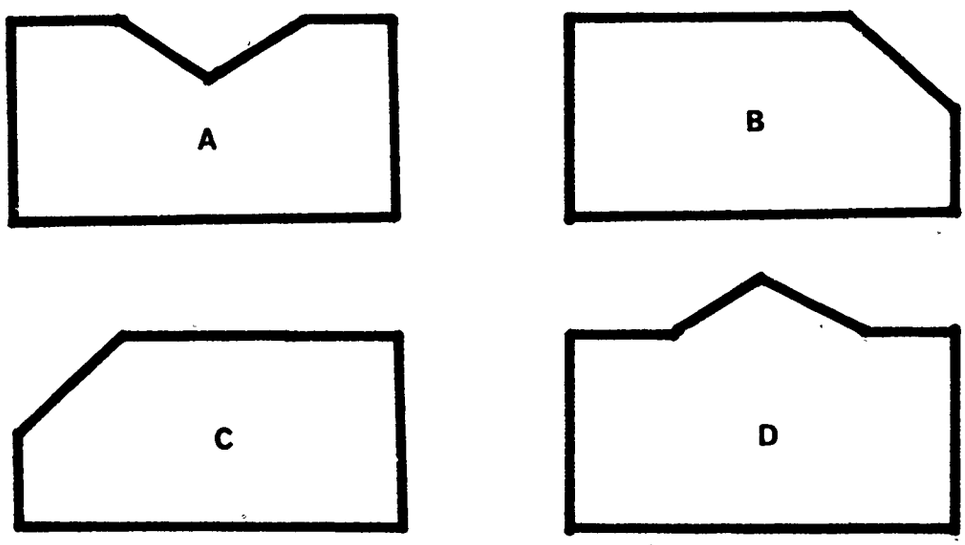


Figure 3. Sample stimulus card.

7.2.4.4 When subjects made a detection, the controller required verification by asking the cadet to point to the target with the pointer; in the cases of incorrect detection, the controller replied: "that is not correct, continue the series."

* Summer only; in the winter phase, exposure time was 15 seconds per slide.
** Parenthetical instruction in winter phase only.
*** In the summer series, the subject was given the sample card only after a correct detection.

This procedure was repeated until a correct detection was made; incorrect detections and correct detections were recorded by slide number.

7.2.4.5 When a correct detection occurred, the subject was read the second part of the instructions:

> "You have correctly detected the target.
> "Your next task is to identify the geometric shape of the target. The slide series will continue from the slide at which you detected the target. The target is a panel cut in one of the shapes shown on the stimulus card. When you are fairly certain you can identify the shape as A, B, C or D, say 'stop' and give the identifying letter of the shape you think is correct. Whether your identification is correct or not, the series will continue.* If, after the first identification, you wish to change your answer, the procedure is the same as before: say 'stop' and give the new identifying letter.
> "Do you have any questions?"

The slide series was continued from this point until a correct identification had been made and recorded.

7.2.4.6 At the end of the series, each subject was admonished not to discuss the nature of the experiment until his individual instructor indicated that the experiment was over, in order to avoid inadvertantly disclosing the target location and shape to future subjects.

7.3 Results and Analysis

7.3.1 Summer Phase

7.3.1.1 Target detection and identification means for experimental groups during the summer phase are shown below:

	DETECTION	IDENTIFICATION
GROUP A (US ARMY PATTERN)	11.97	14.22
GROUP B (DTG)	15.33	17.72
GROUP C (CONTROL)	12.68	13.97

7.3.1.2 Mean scores are expressed as slide number from 1-22, since the slides only approximate the conditions at the actual ground ranges. Analysis indicated that the means for group A and C did not differ significantly; Group B mean differed from Groups A and C in the predicted direction and beyond the .01 level of significance. Results and analysis of the summer phase test are examined in the interim report on that phase (reference 4, appendix VII).

7.3.2 Winter Phase

7.3.2.1 Target detection and identification mean scores are shown below:

* This instruction was added to prevent identification by elimination.

	DETECTION	IDENTIFICATION	N
GROUP 1 (US ARMY PATTERN)	10.9545	11.5909	44
GROUP 2 (DTG PATTERN)	18.1471	19.3529	34
GROUP 3 (SWEDISH ARMY PATTERN)	12.6333	16.8000	30
GROUP 4 (CONTROL PANEL)	18.9643	20.2857	28

7.3.2.1 Analysis

The population parameters for eight target series patterns were estimated. The mean score parameters estimated are listed below:

μ_{1D} - US Army Pattern detection mean score.
μ_{2D} - DTG Pattern " " "
μ_{3D} - Swedish Pattern " " "
μ_{4D} - Control Pattern " " "

μ_{1I} - US Army Pattern identification mean score.
μ_{2I} - DTG Pattern " " "
μ_{3I} - Swedish Pattern " " "
μ_{4I} - Control Panel " " "

Analyses of sample distributions indicated that only the US Army Pattern target detection and identification scores provided a normal distribution. For the other target series, photographs were not taken sufficiently close to the target to allow all subjects to detect the panel. Consequently it was assumed that they would have detected and identified on the next slide (slide 23), and the score of 23 was assigned to those who fell into this category. This was a conservative measure making significance of t-tests more difficult to obtain as it forced the estimated means closer together. Since the t-test is robust and sample size was sufficiently large to allow departure from normality, independent t-tests for differences between means could still be conducted. The hypotheses and results are listed at Table 1.

A post-hoc comparison of US Army and control panels detection and identification scores was conducted using the Scheffé post-hoc comparison test. This test requires an overall significant F from an analysis of variance. Consequently, one-way analysis of variance tests were conducted for both detection and identification scores comparing all four pattern series. The analysis of variance tests are detailed at Table 2. The results of the Scheffé post-hoc comparisons are listed below:

$H_0 : \mu_{1D} - \mu_{4D} = 0$

$H_1 : \mu_{1D} - \mu_{4D} < 0$

$-11.85 \leq \Psi_g \leq -4.18$ Where $\Psi_g = \mu_{1D} - \mu_{4D}$

Reject H_0 as false beyond the .05 level of significance.

$H_0 : \mu_{1I} - \mu_{4I} = 0$

$H_1 : \mu_{1I} - \mu_{4I} < 0$

$-9.892 \leq \Psi_g \leq -7.500$ Where $\Psi_g = \mu_{1I} - \mu_{4I}$

Reject H_0 as false beyond the .05 level of significance.

TABLE 1

SUMMARY OF INDEPENDENT t-TESTS

Hypotheses	t	df (k)	Result
$H_0 : \mu_{1D} - \mu_{2D} = 0$ $H_1 : \mu_{1D} - \mu_{2D} < 0$	-5.65	76	Reject H_o *
$H_0 : \mu_{2D} - \mu_{3D} = 0$ $H_1 : \mu_{2D} - \mu_{3D} > 0$	3.67	62	Reject H_0 *
$H_0 : \mu_{2D} - \mu_{4D} = 0$ $H_1 : \mu_{2D} - \mu_{4D} < 0$	-.52	60	Accept H_0
$H_0 : \mu_{1I} - \mu_{2I} = 0$ $H_1 : \mu_{1I} - \mu_{2I} < 0$	-6.89	76	Reject H_0 *
$H_0 : \mu_{2I} - \mu_{3I} = 0$ $H_1 : \mu_{2I} - \mu_{3I} > 0$	2.12	62	Reject H_0 **
$H_0 : \mu_{2I} - \mu_{4I} = 0$ $H_1 : \mu_{2I} - \mu_{4I} < 0$	-.78	60	Accept H_0

* Test was significant beyond the .001 level.

** Test was significant beyond the .05 level.

TABLE 2

A. 1 X 4 ANALYSIS OF VARIANCE FOR TARGET DETECTION

Source	df	Sum of Squares	Mean Squares	F
Between Groups	3	1657.83	552.61	17.64 *
Within Groups	132	4136.11	31.33	
Total	135	5793.93		

B. 1 X 4 ANALYSIS OF VARIANCE FOR TARGET IDENTIFICATION

Source	df	Sum of Squares	Mean Squares	F
Between Groups	3	1740.97	580.32	26.42 *
Within Groups	132	2898.92	21.96	
Total	135	4639.88		

* Significant beyond the .001 level.

7.4 Discussion

Evaluation of the results in a test of this nature must go beyond simple statistical analysis; a wealth of subjective experience emerged from the relatively straightforward methodology which is of interest to the Army and is in some cases a starting point for further hypotheses. The following observations seem worthy of interest:

7.4.1 The nature of camouflage as a perceptual phenomenon has been something of a mystery. The general ambivalence towards research in camouflage is summarized by John R. Bloomfield in Visual Search:

> Although of major importance, problems of camouflage have received little systematic investigation. This is due, in part, to the great difficulties in defining camouflage situations. . . While it is possible to make quite precise theoretical statements about the artificial stimuli used in competition search tasks, we are still a very long way from being able to deal with the kind of complexities involved in camouflage situations. (Reference 5, appendix VI.)

However, the authors are not uncomfortable with the summary of individual observer properties at paragraph 1.5.2. This is due to an experiment conducted at the same time as the effort described in this report which is reported under separate cover since it is of interest to different agencies than the present report (Reference 6, appendix VI). In this experiment, the results of individual performance on two perceptual psychometric tests designed for the purpose were correlated with performance on the slide series described in this report. When

certain physiological characteristic were controlled, the multiple R was shown to be higher than expected (0.49); while this is not powerful enough to be predictive, it does cast some light on the nature of camouflage, giving empirical support to the hypothesis that detection of camouflage is a combination of visual search habits and fairly specific and stable perceptual organizing properties. This is of some importance, since the DTG pattern was designed based on the presumption that these factors were of some strength in camouflage detection. The reader is urged to compare the specific findings of the referenced report with the results of the present experimental effort.

7.4.2 The performance of the control pattern in summer and winter phases is somewhat confusing on the surface. The green panel performed as predicted in the summer phase, significantly less effective than the DTG Pattern, but not significantly different from the US Army Pattern.* In the winter, however, the control panel was not significantly different from performance of the DTG, and significantly more effective than either conventional pattern (US Army or Swedish). This appears due to two special factors:

7.4.2.1 Many subjects failed to detect either DTG or control panel by the end of the slide series. Such observers received the score 23 (there were 22 slides), since the next logical slide would have been at a distance of approximately 50 feet. The authors presumed that most subjects could not have avoided seeing any of the panels at so close a range. However, this produced an artificially skewed distribution of scores for DTG and Control panels; hence, for comparison between these panels, the means are somewhat bogus, and the true means might have yielded a more definitive comparison.

7.4.2.2 The site chosen appears to have favored the control panel (see photograph, appendix III). There was very little clutter in the area of target position, and the background in the immediate area consisted of deep snow and very light brush. In addition, for most of the slide series a level road embankment coincided with the top edge of the panel, making shape cues virtually nonexistent. The problem was recognized by the camera team during the last stages of the slide series execution, but time and funds were not available for a replacement series.

7.4.3 Subjects made a number of comments during the slide series test. In many cases, subjects were unable to recognize the DTG as a pattern even when the target outline was traced on the screen by the controller. The conventional patterns were much more obvious, since their low texture (in comparison with the background) simply replaced a target shape-schema with a clearly visible pattern schema.

7.4.4 A shortcoming of unstructured camouflage demonstrations (the sort which have traditionally given pattern painting a bad name) was evident in the test. The role of perceptual set is extremely powerful. The panels - all panels - in the winter series were clearly visible to the controllers from the first slide, and the controllers expressed occasional astonishment at the subjects' inability to see the target. This illustrates what is probably the most important single factor in camouflage detection: knowing the nature and location of the target will defeat any measure known. If you know what the target looks like and where it is, its signature will usually be overwhelming; but this does not mean that it will be detected easily by a naïve observer. This general point is illustrated by a popular classroom demonstration of perceptual set: a degraded gestalt-completion slide with visual "noise" depicting the face of Jesus; most students fail to see the face until it is explicitly delineated, but once perceived, the image is there to stay (see figure 4).

* This is not surprising, nor an indication of any ineffectiveness of the present US Army (MERADCOM) pattern; the panels were not garnished (in order to isolate the pattern as independent variable), and the US Army pattern is specifically designed for use with garnish. The DTG was predicted as the high performer in this scenario.

7.4.5 The slide series seems to offer potential as a training aid at unit level. It removes unwanted variables and suggests any number of refinements, and, importantly, is capable of production at unit level with a minimum of expense. The authors caution, however, that certain relatively stable and innate skills are powerful contributors to detection ability with ambiguous stimuli, and there is consequently a probable indivividual ceiling on ability, at least as far as purely native perceptual properties are concerned. Hence, great weight should be given to familiarizing soldiers with important target signatures in ambiguous or degraded situations, then validating their familiarity with these cues in the slide series format.

7.5 Conclusions

7.5.1 The Dual-Texture Gradient Pattern proved significantly more effective than the US Army Pattern in Summer and Winter conditions in terms of range to detection and identification.

7.5.2 The Dual-Texture Gradient Pattern proved significantly more effective than the Swedish Army Pattern in Winter conditions; the comparison with this pattern was made only in Winter.

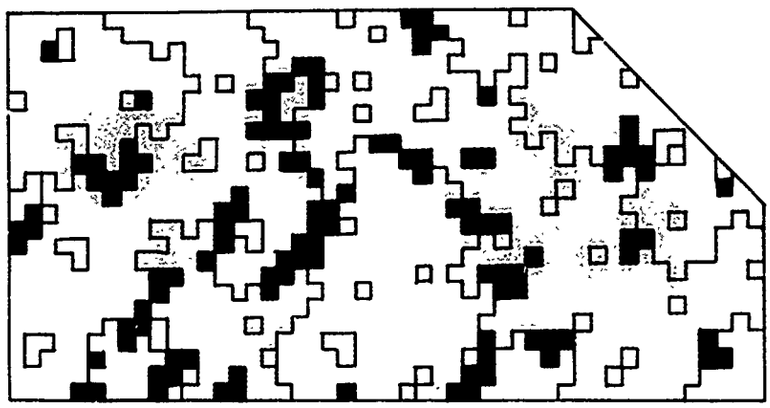
7.5.3 The Dual-Texture Gradient Pattern proved more effective than an unpatterned control panel in Summer; in Winter, apparently due to special environmental factors and problems with data distribution, there was no significant difference between DTG and the white control target.

APPENDIX I. PATTERNS

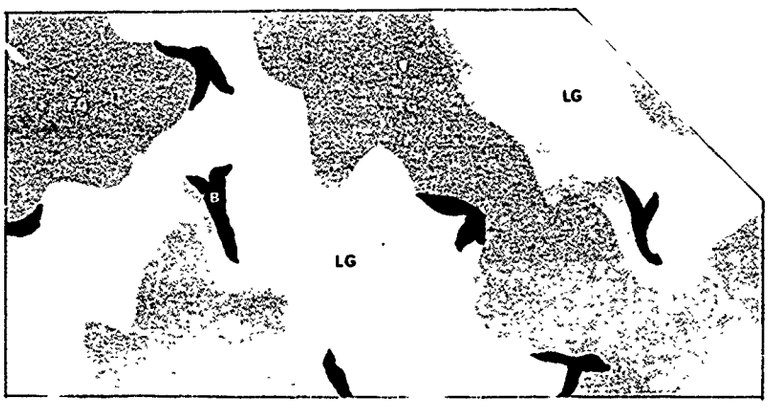
Patterns shown in this appendix are those used on the target panels. Patterns were identical for both summer and winter phases; however, the light green used in summer was painted over with matte white in winter. Colors shown abbreviated in the drawings are:

FG = Forest Green; LG = Light Green; FD = Field Drab; B = Black

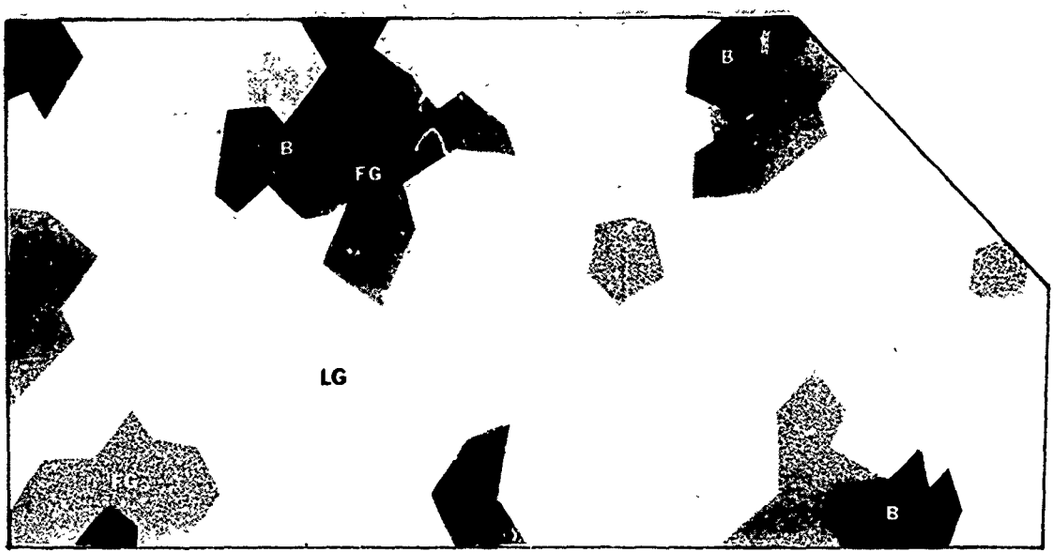
A. DUAL TEXTURE GRADIENT PATTERN



B. US ARMY (MERADCOM) PATTERN

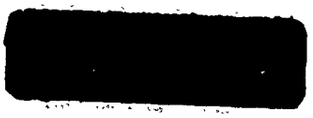


C. SWEDISH ARMY PATTERN



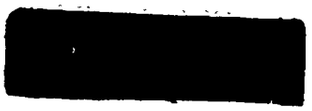
APPENDIX II. PIGMENT SAMPLES

The following color samples are provided for comparison; Forest Green and Field Drab colors were provided by USAMERADCOM.



Forest Green

Field Drab



Light Green

White

Black

APPENDIX III. PHOTOGRAPHS

A. SUMMER TEST SITE (STEWART ARMY SUBPOST)

b. WINTER TEST SITE (UPPER RESERVOIR, CORNWALL-ON-HUDSON)

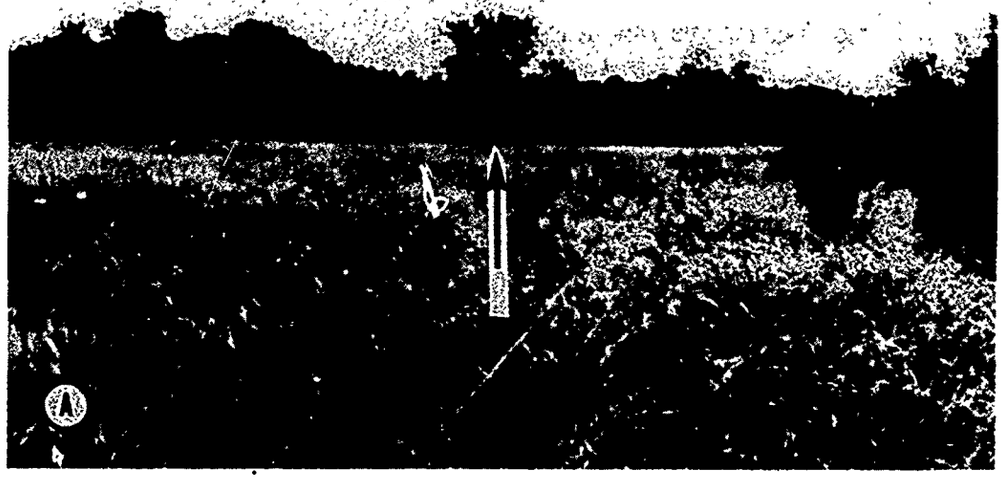
C. TEST PANEL 1 (DUAL-TEXTURE GRADIENT PATTERN)

D. TEST PANEL 2 (US ARMY PATTERN)

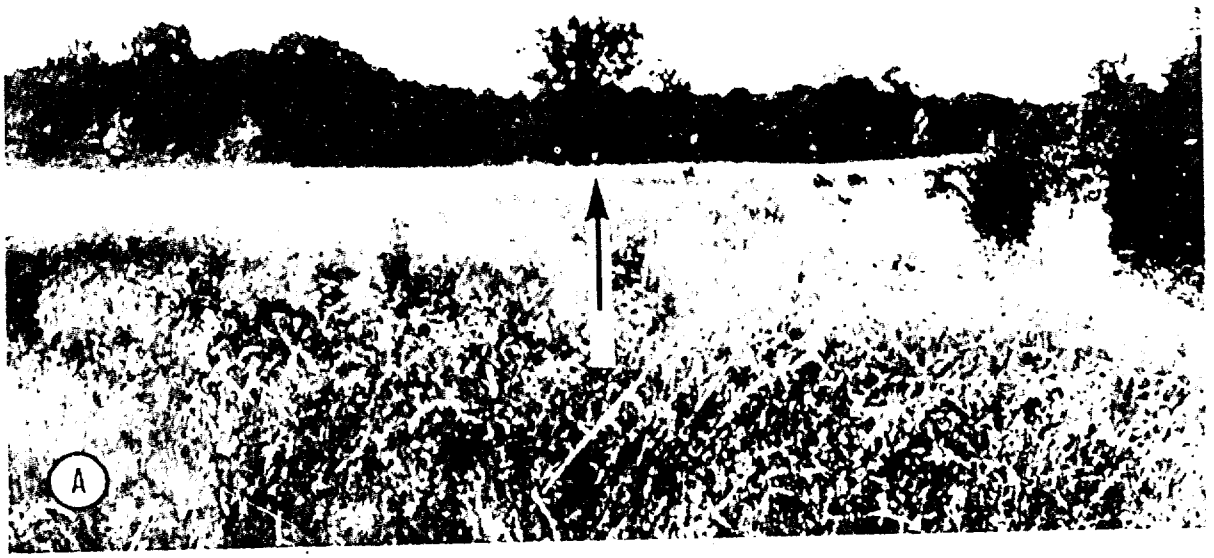
E. TEST PANEL 3 (SWEDISH ARMY PATTERN)

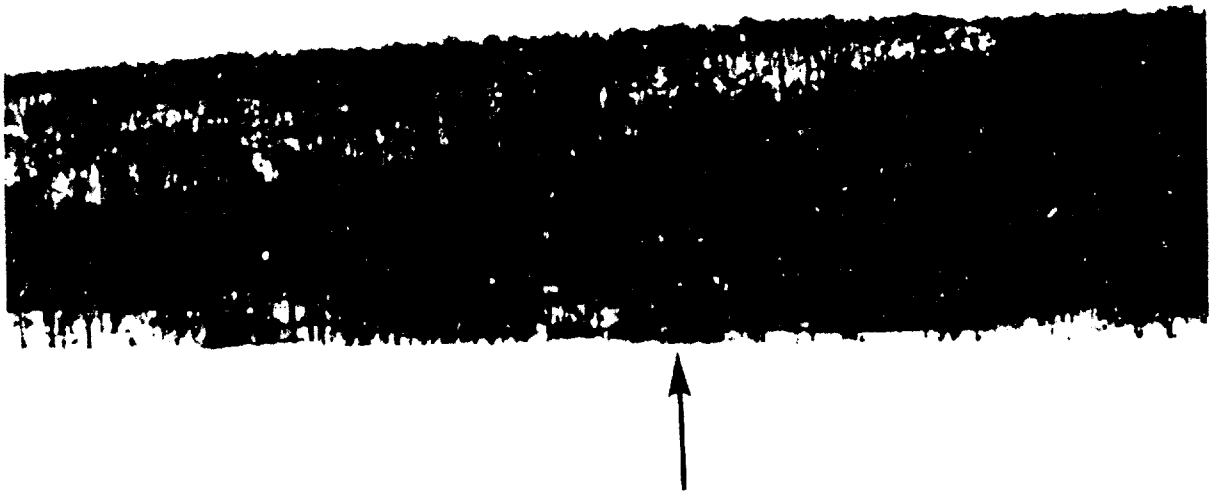
F. WINTER TEST SITE (APPROXIMATELY 200 FEET FROM TARGET POSITION)

G. SLIDE SERIES ADMINISTRATION

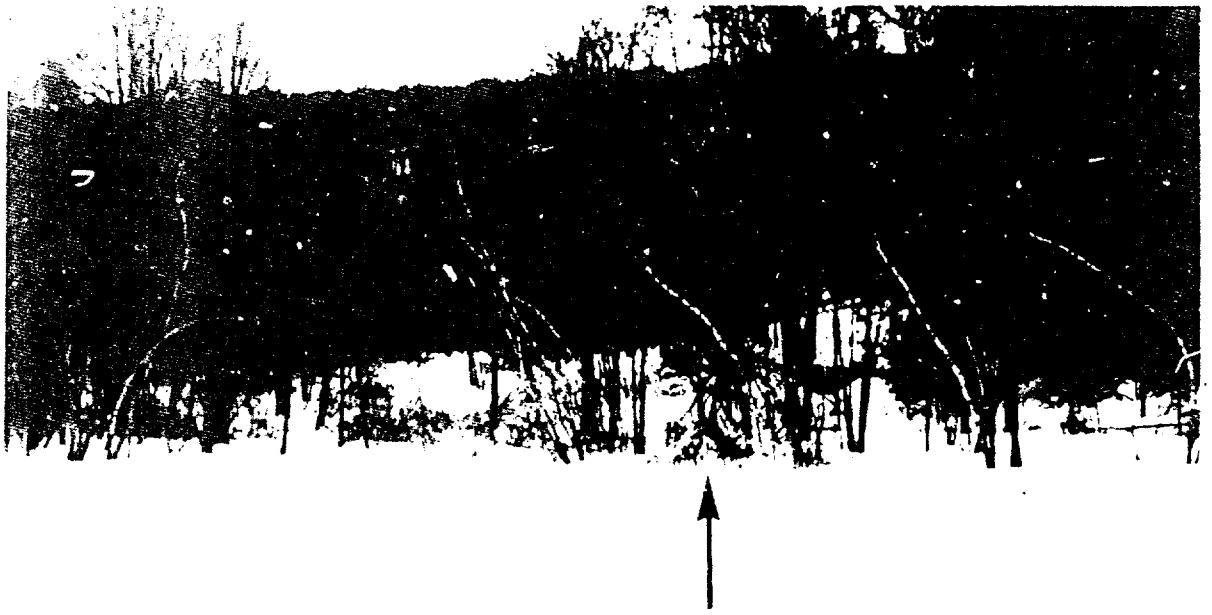

A


B

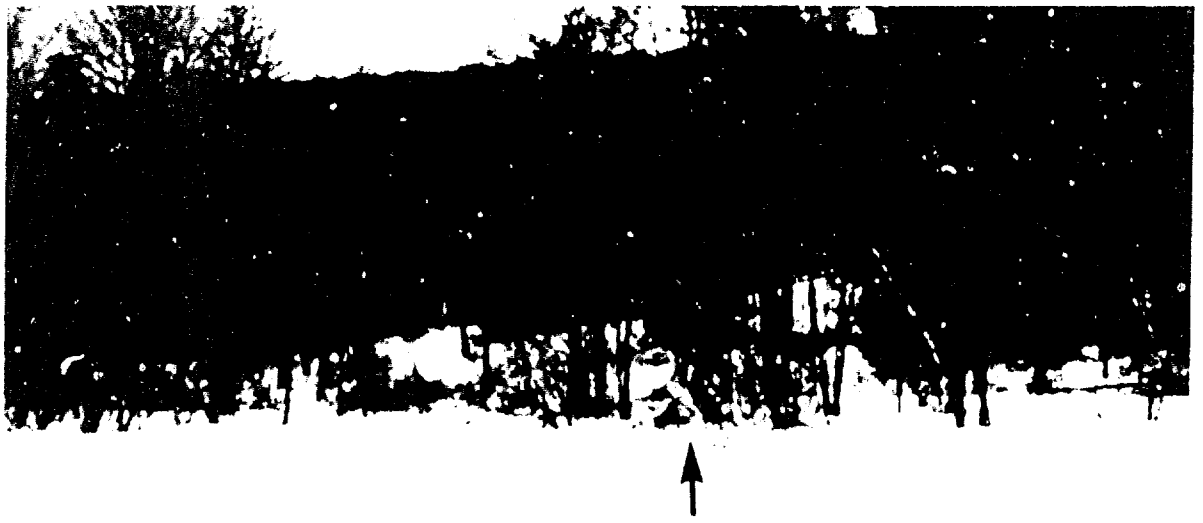




B

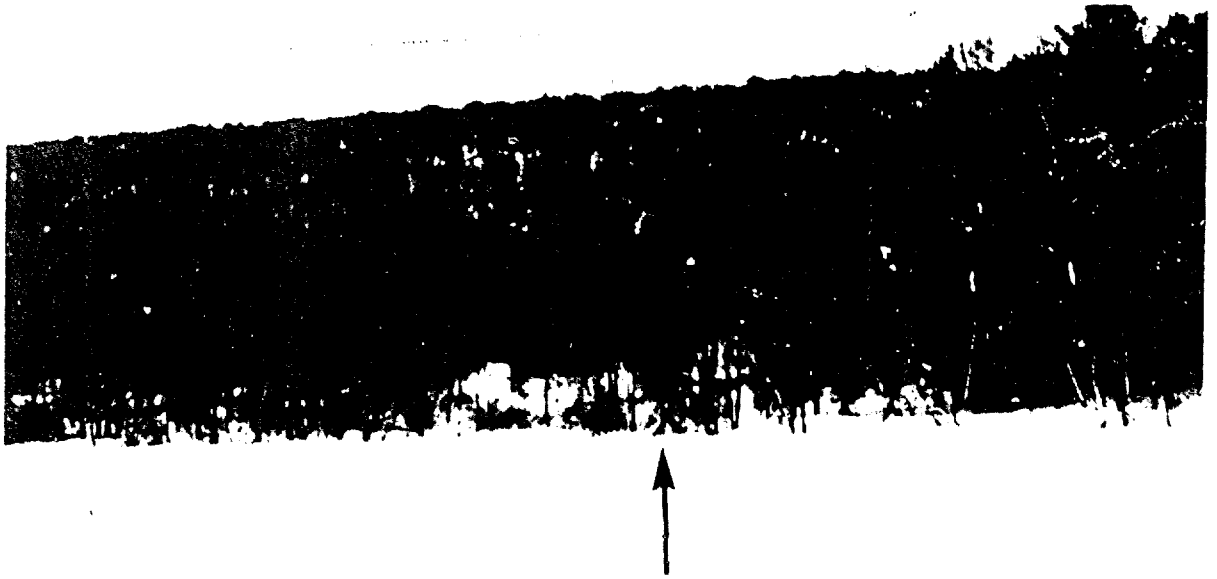


(C)



(D)

(E)



(F)

APPENDIX IV. SUBJECT SELECTION DATA

A. Subjects were male cadets from the Class of 1979 (sophomores) assigned to classes in General Psychology (PL 202). Approximately 260 subjects were employed during the course of the experiment.

B. Subjects varied from 18 to 21 years of age.

C. Following visual requirements are uniform for the United States Corps of Cadets:

Vision: (Disqualification criterion) Distant visual acuity not correctible to at least 20/20 in each eye with spectacle lenses.

Muscle Balance: (Disqualification criterion)

Esophoria over 15 prism diopters.
Exophoria over 10 prism diopters.
Hyperphoria over 2 prism diopters.
Stabismus (tropia) of any degree.

Color Vision: Must be able to distinguish vivid red and vivid green.

Refractive Error: (Disqualification criterior) Myopia over 5.50 diopters in any meridian.

Hyperopia over 5.50 diopters in any meridian.
Astigmatism all type over 3 diopters.
Anisometropia over 3.50 diopters.

APPENDIX V. DATA

The individual subject data listed is reproduced from computer output. Key to listed variables:

VAR 1	Subject Identification Number
VAR 2	Section Number (Identifies instructor/controller)
VAR 3	Wears spectacles? (1 = yes; 0 = no)
VAR 4	Wears contacts? (1 = yes; 0 = no)
VAR 5	Color blind? (1 = no)
VAR 6	Degraded Letter Test Score (Not used in this report; see ref 4 and 5, appendix VI)
VAR 7	Cue-Search Test Score (Not used in this report; see ref 4 and 5, appendix VI)
VAR 8	Distance at Target Detection (expressed as slide number, 1-23)
VAR 9	Distance at Target Identification (expressed as slide number, 1-23)
VAR 10	Number of incorrect detections
VAR 11	Number of incorrect identifications
VAR 12	Group Number: 1 = US Army Pattern 2 = DTG Pattern 3 = Swedish Army Pattern 4 = Control Pattern

FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 1

VAR1	1.00	VAR2	6.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	12.00	VAR7	7.00	VAR8	5.00	VAR9	5.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 2

VAR1	2.00	VAR2	8.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	9.00	VAR7	5.00	VAR8	7.00	VAR9	7.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 3

VAR1	3.00	VAR2	8.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	12.00	VAR7	5.00	VAR8	10.00	VAR9	10.00	VAR10	3.00
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 4

VAR1	11.00	VAR2	1.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	12.00	VAR7	5.00	VAR8	11.00	VAR9	13.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 5

VAR1	15.00	VAR2	1.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	17.00	VAR7	7.00	VAR8	13.00	VAR9	13.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 6

VAR1	19.00	VAR2	1.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	12.00	VAR7	5.00	VAR8	14.00	VAR9	16.00	VAR10	1.00
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 7

VAR1	21.00	VAR2	1.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	15.00	VAR7	6.00	VAR8	3.00	VAR9	3.00	VAR10	0.
VAR11	0.	VAR12	1.00						

FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 8

VAR1	29.00	VAR2	1.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	17.00	VAR7	7.00	VAR8	15.00	VAR9	16.00	VAR10	2.00
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 9

VAR1	31.00	VAR2	5.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	21.00	VAR7	4.00	VAR8	8.00	VAR9	8.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 10

VAR1	35.00	VAR2	5.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	16.00	VAR7	6.00	VAR8	14.00	VAR9	14.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 11

VAR1	41.00	VAR2	5.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	15.00	VAR7	7.00	VAR8	11.00	VAR9	13.00	VAR10	2.00
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 12

VAR1	42.00	VAR2	5.00	VAR3	0.	VAR4	0.	VAR5	0.
VAR6	15.00	VAR7	5.00	VAR8	15.00	VAR9	16.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 13

VAR1	46.00	VAR2	5.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	16.00	VAR7	6.00	VAR8	6.00	VAR9	7.00	VAR10	1.00
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 14

VAR1	49.00	VAR2	5.00	VAR3	0.	VAR4	1.00	VAR5	1.00
VAR6	10.00	VAR7	7.00	VAR8	9.00	VAR9	9.00	VAR10	7.00
VAR11	0.	VAR12	1.00						

• FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 15

VAR1	51.00	VAR2	5.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	12.00	VAR7	7.00	VAR8	13.00	VAR9	13.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 16

VAR1	58.00	VAR2	6.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	12.00	VAR7	6.00	VAR8	13.00	VAR9	14.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 17

VAR1	64.00	VAR2	6.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	11.00	VAR7	7.00	VAR8	14.00	VAR9	14.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 18

VAR1	67.00	VAR2	6.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	8.00	VAR7	5.00	VAR8	16.00	VAR9	16.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 19

VAR1	71.00	VAR2	6.00	VAR3	1.00	VAR4	1.00	VAR5	1.00
VAR6	12.00	VAR7	6.00	VAR8	7.00	VAR9	8.00	VAR10	5.00
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 20

VAR1	76.00	VAR2	5.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	11.00	VAR7	7.00	VAR8	11.00	VAR9	11.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 21

VAR1	80.00	VAR2	3.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	17.00	VAR7	6.00	VAR8	11.00	VAR9	11.00	VAR10	0.
VAR11	0.	VAR12	1.00						

FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 22

VAR1	82.00	VAR2	3.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	9.00	VAR7	9.00	VAR8	13.00	VAR9	13.00	VAR10	1.00
VAR11	1.00	VAR12	1.00						

CONTENTS OF CASE NUMBER 23

VAR1	83.00	VAR2	3.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	10.00	VAR7	5.00	VAR8	11.00	VAR9	11.00	VAR10	1.00
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 24

VAR1	88.00	VAR2	3.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	15.00	VAR7	6.00	VAR8	7.00	VAR9	8.00	VAR10	0.
VAR11	1.00	VAR12	1.00						

CONTENTS OF CASE NUMBER 25

VAR1	93.00	VAR2	3.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	15.00	VAR7	6.00	VAR8	3.00	VAR9	3.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 26

VAR1	97.00	VAR2	2.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	9.00	VAR7	5.00	VAR8	17.00	VAR9	18.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 27

VAR1	102.00	VAR2	2.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	16.00	VAR7	4.00	VAR8	3.00	VAR9	3.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 28

VAR1	103.00	VAR2	2.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	20.00	VAR7	8.00	VAR8	11.00	VAR9	12.00	VAR10	0.
VAR11	0.	VAR12	1.00						

FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 29

VAR1	106.00	VAR2	4.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	13.00	VAR7	7.00	VAR8	11.00	VAR9	15.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 30

VAR1	109.00	VAR2	4.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	12.00	VAR7	4.00	VAR8	14.00	VAR9	15.00	VAR10	3.00
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 31

VAR1	114.00	VAR2	4.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	13.00	VAR7	10.00	VAR8	7.00	VAR9	9.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 32

VAR1	120.00	VAR2	4.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	9.00	VAR7	5.00	VAR8	23.00	VAR9	23.00	VAR10	1.00
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 33

VAR1	122.00	VAR2	4.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	7.00	VAR7	4.00	VAR8	19.00	VAR9	20.00	VAR10	2.00
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 34

VAR1	128.00	VAR2	3.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	12.00	VAR7	6.00	VAR8	7.00	VAR9	8.00	VAR10	1.00
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 35

VAR1	130.00	VAR2	3.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	16.00	VAR7	5.00	VAR8	23.00	VAR9	23.00	VAR10	0.
VAR11	0.	VAR12	1.00						

FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 36

VAR1	133.00	VAR2	3.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	7.00	VAR7	6.00	VAR8	7.00	VAR9	8.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 37

VAR1	134.00	VAR2	3.00	VAR3	0.	VAR4	1.00	VAR5	0.
VAR6	18.00	VAR7	6.00	VAR8	8.00	VAR9	8.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 38

VAR1	135.00	VAR2	3.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	12.00	VAR7	5.00	VAR8	18.00	VAR9	18.00	VAR10	3.00
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 39

VAR1	145.00	VAR2	2.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	9.00	VAR7	5.00	VAR8	7.00	VAR9	8.00	VAR10	1.00
VAR11	3.00	VAR12	1.00						

CONTENTS OF CASE NUMBER 40

VAR1	149.00	VAR2	2.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	6.00	VAR7	5.00	VAR8	15.00	VAR9	15.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 41

VAR1	152.00	VAR2	2.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	17.00	VAR7	6.00	VAR8	9.00	VAR9	9.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 42

VAR1	157.00	VAR2	2.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	14.00	VAR7	7.00	VAR8	9.00	VAR9	10.00	VAR10	2.00
VAR11	0.	VAR12	1.00						

FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 43

VAR1	159.00	VAR2	2.00	VAR3	0.	VAR4	1.00	VAR5	1.00
VAR6	17.00	VAR7	5.00	VAR8	6.00	VAR9	8.00	VAR10	0.
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 44

VAR1	160.00	VAR2	2.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	19.00	VAR7	3.00	VAR8	8.00	VAR9	8.00	VAR10	1.00
VAR11	0.	VAR12	1.00						

CONTENTS OF CASE NUMBER 45

VAR1	6.00	VAR2	3.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	9.00	VAR7	4.00	VAR8	23.00	VAR9	23.00	VAR10	5.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 46

VAR1	8.00	VAR2	3.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	11.00	VAR7	5.00	VAR8	1.00	VAR9	17.00	VAR10	0.
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 47

VAR1	12.00	VAR2	1.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	13.00	VAR7	5.00	VAR8	20.00	VAR9	21.00	VAR10	1.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 48

VAR1	16.00	VAR2	1.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	14.00	VAR7	4.00	VAR8	23.00	VAR9	23.00	VAR10	3.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 49

VAR1	20.00	VAR2	1.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	13.00	VAR7	7.00	VAR8	23.00	VAR9	23.00	VAR10	0.
VAR11	0.	VAR12	2.00						

FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 50

VAR1	22.00	VAR2	1.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	11.00	VAR7	5.00	VAR8	19.00	VAR9	19.00	VAR10	2.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 51

VAR1	30.00	VAR2	1.00	VAR3	0.	VAR4	1.00	VAR5	1.00
VAR6	14.00	VAR7	3.00	VAR8	23.00	VAR9	23.00	VAR10	4.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 52

VAR1	36.00	VAR2	5.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	13.00	VAR7	5.00	VAR8	16.00	VAR9	18.00	VAR10	0.
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 53

VAR1	39.00	VAR2	5.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	13.00	VAR7	3.00	VAR8	23.00	VAR9	23.00	VAR10	2.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 54

VAR1	47.00	VAR2	5.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	10.00	VAR7	5.00	VAR8	23.00	VAR9	23.00	VAR10	3.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 55

VAR1	48.00	VAR2	5.00	VAR3	0.	VAR4	1.00	VAR5	1.00
VAR6	13.00	VAR7	5.00	VAR8	23.00	VAR9	23.00	VAR10	2.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 56

VAR1	56.00	VAR2	6.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	15.00	VAR7	7.00	VAR8	20.00	VAR9	20.00	VAR10	0.
VAR11	0.	VAR12	2.00						

FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 57

VAR1	60.00	VAR2	6.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	16.00	VAR7	7.00	VAR8	13.00	VAR9	13.00	VAR10	1.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 58

VAR1	62.00	VAR2	6.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	18.00	VAR7	3.00	VAR8	23.00	VAR9	23.00	VAR10	1.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 59

VAR1	65.00	VAR2	6.00	VAR3	0.	VAR4	0.	VAR5	0.
VAR6	9.00	VAR7	7.00	VAR8	23.00	VAR9	23.00	VAR10	1.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 60

VAR1	69.00	VAR2	6.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	19.00	VAR7	6.00	VAR8	23.00	VAR9	23.00	VAR10	2.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 61

VAR1	72.00	VAR2	6.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	3.00	VAR7	7.00	VAR8	23.00	VAR9	23.00	VAR10	2.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 62

VAR1	74.00	VAR2	6.00	VAR3	0.	VAR4	0.	VAR5	0.
VAR6	12.00	VAR7	5.00	VAR8	23.00	VAR9	23.00	VAR10	1.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 63

VAR1	79.00	VAR2	3.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	15.00	VAR7	6.00	VAR8	13.00	VAR9	13.00	VAR10	0.
VAR11	0.	VAR12	2.00						

FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 6

VAR1	84.00	VAR2	3.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	16.00	VAR7	5.00	VAR8	20.00	VAR9	20.00	VAR10	1.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 65

VAR1	89.00	VAR2	3.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	10.00	VAR7	7.00	VAR8	21.00	VAR9	22.00	VAR10	1.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 66

VAR1	95.00	VAR2	3.00	VAR3	0.	VAR4	1.00	VAR5	1.00
VAR6	16.00	VAR7	5.00	VAR8	23.00	VAR9	23.00	VAR10	0.
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 67

VAR1	99.00	VAR2	2.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	12.00	VAR7	9.00	VAR8	11.00	VAR9	13.00	VAR10	0.
VAR11	1.00	VAR12	2.00						

CONTENTS OF CASE NUMBER 68

VAR1	101.00	VAR2	2.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	11.00	VAR7	4.00	VAR8	21.00	VAR9	22.00	VAR10	1.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 69

VAR1	111.00	VAR2	4.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	9.00	VAR7	1.00	VAR8	7.00	VAR9	6.00	VAR10	0.
VAR11	1.00	VAR12	2.00						

CONTENTS OF CASE NUMBER 70

VAR1	112.00	VAR2	4.00	VAR3	0.	VAR4	1.00	VAR5	1.00
VAR6	9.00	VAR7	8.00	VAR8	10.00	VAR9	10.00	VAR10	2.00
VAR11	0.	VAR12	2.00						

FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 71

VAR1	116.00	VAR2	4.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	9.00	VAR7	5.00	VAR8	21.00	VAR9	23.00	VAR10	1.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 72

VAR1	118.00	VAR2	4.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	9.00	VAR7	7.00	VAR8	23.00	VAR9	23.00	VAR10	1.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 73

VAR1	123.00	VAR2	4.00	VAR3	0.	VAR4	1.00	VAR5	1.00
VAR6	10.00	VAR7	5.00	VAR8	16.00	VAR9	16.00	VAR10	0.
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 74

VAR1	136.00	VAR2	6.00	VAR3	0.	VAR4	1.00	VAR5	1.00
VAR6	9.00	VAR7	5.00	VAR8	3.00	VAR9	17.00	VAR10	0.
VAR11	2.00	VAR12	2.00						

CONTENTS OF CASE NUMBER 75

VAR1	137.00	VAR2	5.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	15.00	VAR7	7.00	VAR8	13.00	VAR9	13.00	VAR10	4.00
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 76

VAR1	155.00	VAR2	2.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	21.00	VAR7	5.00	VAR8	23.00	VAR9	23.00	VAR10	0.
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 77

VAR1	156.00	VAR2	2.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	14.00	VAR7	7.00	VAR8	20.00	VAR9	23.00	VAR10	0.
VAR11	0.	VAR12	2.00						

FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 78

VAR1	156.00	VAR2	2.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	23.00	VAR7	9.00	VAR8	7.00	VAR9	7.00	VAR10	0.
VAR11	0.	VAR12	2.00						

CONTENTS OF CASE NUMBER 79

VAR1	13.00	VAR2	1.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	9.00	VAR7	6.00	VAR8	18.00	VAR9	19.00	VAR10	1.00
VAR11	0.	VAR12	3.00						

CONTENTS OF CASE NUMBER 80

VAR1	17.00	VAR2	1.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	6.00	VAR7	8.00	VAR8	16.00	VAR9	16.00	VAR10	0.
VAR11	0.	VAR12	3.00						

CONTENTS OF CASE NUMBER 81

VAR1	24.00	VAR2	1.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	9.00	VAR7	6.00	VAR8	4.00	VAR9	16.00	VAR10	0.
VAR11	1.00	VAR12	3.00						

CONTENTS OF CASE NUMBER 82

VAR1	26.00	VAR2	1.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	26.00	VAR7	1.00	VAR8	20.00	VAR9	20.00	VAR10	1.00
VAR11	0.	VAR12	3.00						

CONTENTS OF CASE NUMBER 83

VAR1	28.00	VAR2	1.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	17.00	VAR7	9.00	VAR8	6.00	VAR9	10.00	VAR10	1.00
VAR11	0.	VAR12	3.00						

CONTENTS OF CASE NUMBER 84

VAR1	32.00	VAR2	5.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	19.00	VAR7	5.00	VAR8	19.00	VAR9	21.00	VAR10	0.
VAR11	1.00	VAR12	5.00						

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FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 85

VAR1	34.00	VAR2	5.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	8.00	VAR7	7.00	VAR8	19.00	VAR9	22.00	VAR10	0.
VAR11	1.00	VAR12	3.00						

CONTENTS OF CASE NUMBER 86

VAR1	40.00	VAR2	5.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	11.00	VAR7	9.00	VAR8	19.00	VAR9	23.00	VAR10	4.00
VAR11	1.00	VAR12	3.00						

CONTENTS OF CASE NUMBER 87

VAR1	57.00	VAR2	6.00	VAR3	0.	VAR4	1.00	VAR5	1.00
VAR6	20.00	VAR7	7.00	VAR8	4.00	VAR9	7.00	VAR10	0.
VAR11	0.	VAR12	3.00						

CONTENTS OF CASE NUMBER 88

VAR1	63.00	VAR2	6.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	4.00	VAR7	3.00	VAR8	10.00	VAR9	13.00	VAR10	0.
VAR11	0.	VAR12	3.00						

CONTENTS OF CASE NUMBER 89

VAR1	70.00	VAR2	5.00	VAR3	0.	VAR4	1.00	VAR5	1.00
VAR6	17.00	VAR7	4.00	VAR8	15.00	VAR9	19.00	VAR10	1.00
VAR11	1.00	VAR12	3.00						

CONTENTS OF CASE NUMBER 90

VAR1	77.00	VAR2	5.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	21.00	VAR7	9.00	VAR8	1.00	VAR9	16.00	VAR10	0.
VAR11	1.00	VAR12	3.00						

CONTENTS OF CASE NUMBER 91

VAR1	81.00	VAR2	3.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	16.00	VAR7	8.00	VAR8	9.00	VAR9	17.00	VAR10	1.00
VAR11	3.00	VAR12	3.00						

FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 92

VAR1	85.00	VAR2	5.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	18.00	VAR7	4.00	VAR8	17.00	VAR9	18.00	VAR10	0.
VAR11	0.	VAR12	3.00						

CONTENTS OF CASE NUMBER 93

VAR1	87.00	VAR2	5.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	13.00	VAR7	3.00	VAR8	16.00	VAR9	16.00	VAR10	0.
VAR11	0.	VAR12	3.00						

CONTENTS OF CASE NUMBER 94

VAR1	91.00	VAR2	3.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	10.00	VAR7	9.00	VAR8	16.00	VAR9	23.00	VAR10	1.00
VAR11	4.00	VAR12	3.00						

CONTENTS OF CASE NUMBER 95

VAR1	98.00	VAR2	2.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	12.00	VAR7	4.00	VAR8	10.00	VAR9	12.00	VAR10	0.
VAR11	1.00	VAR12	3.00						

CONTENTS OF CASE NUMBER 96

VAR1	108.00	VAR2	4.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	9.00	VAR7	3.00	VAR8	16.00	VAR9	23.00	VAR10	2.00
VAR11	2.00	VAR12	3.00						

CONTENTS OF CASE NUMBER 97

VAR1	110.00	VAR2	4.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	20.00	VAR7	5.00	VAR8	13.00	VAR9	14.00	VAR10	0.
VAR11	0.	VAR12	3.00						

CONTENTS OF CASE NUMBER 98

VAR1	113.00	VAR2	4.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	18.00	VAR7	10.00	VAR8	15.00	VAR9	13.00	VAR10	1.00
VAR11	0.	VAR12	3.00						

FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 99

VAR1	119.00	VAR2	4.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	13.00	VAR7	3.00	VAR8	16.00	VAR9	16.00	VAR10	1.00
VAR11	0.	VAR12	3.00						

CONTENTS OF CASE NUMBER 100

VAR1	124.00	VAR2	4.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	10.00	VAR7	6.00	VAR8	17.00	VAR9	19.00	VAR10	1.00
VAR11	0.	VAR12	3.00						

CONTENTS OF CASE NUMBER 101

VAR1	131.00	VAR2	3.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	11.00	VAR7	5.00	VAR8	12.00	VAR9	12.00	VAR10	3.00
VAR11	0.	VAR12	3.00						

CONTENTS OF CASE NUMBER 102

VAR1	132.00	VAR2	3.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	20.00	VAR7	6.00	VAR8	6.00	VAR9	23.00	VAR10	0.
VAR11	2.00	VAR12	3.00						

CONTENTS OF CASE NUMBER 103

VAR1	140.00	VAR2	2.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	7.00	VAR7	4.00	VAR8	10.00	VAR9	17.00	VAR10	0.
VAR11	0.	VAR12	3.00						

CONTENTS OF CASE NUMBER 104

VAR1	141.00	VAR2	2.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	5.00	VAR7	7.00	VAR8	6.00	VAR9	12.00	VAR10	1.00
VAR11	1.00	VAR12	3.00						

CONTENTS OF CASE NUMBER 105

VAR1	148.00	VAR2	2.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	21.00	VAR7	3.00	VAR8	9.00	VAR9	9.00	VAR10	0.
VAR11	0.	VAR12	3.00						

FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 106

VAR1	153.00	VAR2	2.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	12.00	VAR7	3.00	VAR8	14.00	VAR9	15.00	VAR10	2.00
VAR11	0.	VAR12	3.00						

CONTENTS OF CASE NUMBER 107

VAR1	154.00	VAR2	2.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	18.00	VAR7	7.00	VAR8	20.00	VAR9	20.00	VAR10	0.
VAR11	0.	VAR12	3.00						

CONTENTS OF CASE NUMBER 108

VAR1	161.00	VAR2	5.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	16.00	VAR7	7.00	VAR8	8.00	VAR9	23.00	VAR10	0.
VAR11	2.00	VAR12	3.00						

CONTENTS OF CASE NUMBER 109

VAR1	14.00	VAR2	1.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	3.00	VAR7	5.00	VAR8	23.00	VAR9	23.00	VAR10	3.00
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 110

VAR1	18.00	VAR2	1.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	10.00	VAR7	7.00	VAR8	23.00	VAR9	23.00	VAR10	1.00
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 111

VAR1	25.00	VAR2	1.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	11.00	VAR7	7.00	VAR8	23.00	VAR9	23.00	VAR10	3.00
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 112

VAR1	27.00	VAR2	1.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	9.00	VAR7	5.00	VAR8	23.00	VAR9	23.00	VAR10	3.00
VAR11	0.	VAR12	4.00						

FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 113

VAR1	33.00	VAR2	5.00	VAR3	0.	VAR4	1.00	VAR5	1.00
VAR6	13.00	VAR7	7.00	VAR8	16.00	VAR9	17.00	VAR10	0.
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 114

VAR1	38.00	VAR2	5.00	VAR3	0.	VAR4	1.00	VAR5	1.00
VAR6	6.00	VAR7	5.00	VAR8	10.00	VAR9	15.00	VAR10	1.00
VAR11	1.00	VAR12	4.00						

CONTENTS OF CASE NUMBER 115

VAR1	44.00	VAR2	5.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	13.00	VAR7	6.00	VAR8	11.00	VAR9	14.00	VAR10	1.00
VAR11	1.00	VAR12	4.00						

CONTENTS OF CASE NUMBER 116

VAR1	55.00	VAR2	6.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	14.00	VAR7	7.00	VAR8	23.00	VAR9	23.00	VAR10	2.00
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 117

VAR1	59.00	VAR2	6.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	15.00	VAR7	6.00	VAR8	12.00	VAR9	12.00	VAR10	0.
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 118

VAR1	61.00	VAR2	6.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	14.00	VAR7	4.00	VAR8	23.00	VAR9	23.00	VAR10	0.
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 119

VAR1	66.00	VAR2	6.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	7.00	VAR7	7.00	VAR8	6.00	VAR9	14.00	VAR10	0.
VAR11	0.	VAR12	4.00						

FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 120

VAR1	68.00	VAR2	6.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	13.00	VAR7	6.00	VAR8	12.00	VAR9	12.00	VAR10	1.00
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 121

VAR1	73.00	VAR2	6.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	5.00	VAR7	3.00	VAR8	23.00	VAR9	23.00	VAR10	1.00
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 122

VAR1	78.00	VAR2	3.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	12.00	VAR7	3.00	VAR8	22.00	VAR9	22.00	VAR10	1.00
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 123

VAR1	86.00	VAR2	5.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	14.00	VAR7	7.00	VAR8	12.00	VAR9	13.00	VAR10	0.
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 124

VAR1	90.00	VAR2	5.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	13.00	VAR7	7.00	VAR8	23.00	VAR9	23.00	VAR10	3.00
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 125

VAR1	94.00	VAR2	3.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	5.00	VAR7	7.00	VAR8	23.00	VAR9	23.00	VAR10	2.00
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 126

VAR1	100.00	VAR2	2.00	VAR3	0.	VAR4	1.00	VAR5	1.00
VAR6	14.00	VAR7	7.00	VAR8	23.00	VAR9	23.00	VAR10	0.
VAR11	0.	VAR12	4.00						

FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 127

VAR1	104.00	VAR2	2.00	VAR3	1.00	VAR4	0.	VAR5	0.
VAR6	7.00	VAR7	7.00	VAR8	23.00	VAR9	23.00	VAR10	2.00
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 128

VAR1	107.00	VAR2	4.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	12.00	VAR7	4.00	VAR8	23.00	VAR9	23.00	VAR10	2.00
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 129

VAR1	115.00	VAR2	4.00	VAR3	0.	VAR4	1.00	VAR5	1.00
VAR6	11.00	VAR7	6.00	VAR8	23.00	VAR9	23.00	VAR10	5.00
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 130

VAR1	121.00	VAR2	4.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	12.00	VAR7	5.00	VAR8	23.00	VAR9	23.00	VAR10	3.00
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 131

VAR1	125.00	VAR2	4.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	7.00	VAR7	7.00	VAR8	23.00	VAR9	23.00	VAR10	0.
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 132

VAR1	127.00	VAR2	3.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	12.00	VAR7	5.00	VAR8	7.00	VAR9	23.00	VAR10	0.
VAR11	1.00	VAR12	4.00						

CONTENTS OF CASE NUMBER 133

VAR1	142.00	VAR2	2.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	15.00	VAR7	5.00	VAR8	23.00	VAR9	23.00	VAR10	5.00
VAR11	0.	VAR12	4.00						

FILE NONAME (CREATION DATE = 03/14/77)

CONTENTS OF CASE NUMBER 134

VAR1	144.00	VAR2	2.00	VAR3	1.00	VAR4	0.	VAR5	1.00
VAR6	7.00	VAR7	5.00	VAR8	17.00	VAR9	18.00	VAR10	3.00
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 135

VAR1	146.00	VAR2	2.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	14.00	VAR7	8.00	VAR8	15.00	VAR9	17.00	VAR10	1.00
VAR11	0.	VAR12	4.00						

CONTENTS OF CASE NUMBER 136

VAR1	147.00	VAR2	2.00	VAR3	0.	VAR4	0.	VAR5	1.00
VAR6	15.00	VAR7	6.00	VAR8	23.00	VAR9	23.00	VAR10	1.00
VAR11	0.	VAR12	4.00						

APPENDIX VI. REFERENCES

1. (U) Adolph H. Humphreys and Sharon V. Jarvis, Camouflage Pattern Painting Report of USAMERDC's Camouflage Support Team to MASSTER: US Army Mobility Equipment Research and Development Center Report No. 2090, February 1974.

2. (U) Sharon V. Jarvis, TECHNICAL MEMORANDUM: Fort Knox Test of Camouflage Pattern Effectiveness: US Army Mobility Equipment Research and Development Center, August 1974.

3. John A. Barnes and N. William Doss, Human Engineering Laboratory Camouflage Application Test (HELCAT) Observer Performance, Technical Memorandum 32-76: US Army Human Engineering Laboratory, November 1976.

4. T. R. O'Neill et al., Interim Report - Evaluation of Dual-Texture Gradient Pattern and Investigation of Psychometric Correlates of Camouflaged Target Acquisition and Identification: US Military Academy, November 1976.

5. T. R. O'Neill et al., Investigation of Psychometric Correlates of Camouflaged Target Acquisition and Identification: US Military Academy, April 1977.

6. John R. Bloomfield, "Experiments in Visual Search", Visual Search: National Academy of Sciences, Washington, DC, 1973.

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